REF2021

| **Institution:** |
| Durham University |

| **Unit of assessment:** |
| UoA4 – Psychology, Psychiatry and Neuroscience |

Section 1. Unit context and structure, research and impact strategy

1.1 Context and overview

Durham Psychology, a department of 34 FTE, is an internationally recognised centre of research excellence and interdisciplinarity across the breadth of psychological and behavioural science. Significant investment in buildings and staff over the assessment period has allowed us to meet, and exceed, our 2014 strategic ambitions. We have consolidated our staff onto the main University campus, having been previously split across two sites 20miles apart, and we have expanded our globally recognised strengths in Cognitive Neuroscience and Developmental Science by establishing a new research group in Quantitative Social Psychology.

The department has achieved significant growth on all key metrics of success. Since 2014, we have more than doubled our research income, achieved a 60% increase in registered research students, and have progressed from Bronze to two successive Silver Athena Swan awards. For 6 of the last 7 years we have been the highest ranked department globally for total citations per FTE (QS) and we have climbed 100 places in the overall QS world rankings for Psychology, from a 151-200 ranking in 2014, to the 51-100 bracket currently maintained since 2016. The value of our research has been recognised through prestigious British Psychological Society prizes and has led to successful clinical and policy interventions, while our cultural and scientific outreach work has reached audiences of thousands. Our expansion from 30 FTE in 2013/14 is set to reach 44 by 2022.

1.2 Structure

Merging the department onto one site allowed strategic consolidation of staff into three research groups, reflecting our major areas of activity: **Cognitive Neuroscience (CogNeuro)**, **Developmental Science (DevSci)** and **Quantitative Social Psychology (QSP)**. These groups provide a core 'home' for academics, research staff and research students, through which they access shared resources, peer support and feedback, and topic- or method-focused activities in their area of expertise. Each group is provided a budget to support activities which enhance the research of members, and groups are empowered to use these funds in line with their own strategic priorities. Each group also leads on a Masters programme, delivering research-led postgraduate education.

Our interdisciplinary strategy (below) is served by Research Centres, which **bring in staff from across the department and from elsewhere in the university and the region to focus on a particular topic**. Staff belong to one research group but may be members of multiple centres, including those external to the department. Finally, staff may also belong to one of the University's research institutes (5A.2.2). The overall research structure of the department is shown in Figure 1 below.

Research Groups

Alderson-Day, Clay, Cowie, **Fernyhough**, Hanley, **Nardini**, **Reissland, Riby**

Atkinson, Beierholm, Easton, **Ellison**, Grubert, **Hausmann**, **Kentridge**, Lane, Lever, McGregor, Olkkonen, Sanderson, Smith, Thaler, Wiese

Boothroyd, Burt, Covey, **Crisp**, Ihssen, Leite, Nguyen, Ross, **Towl**, van de Vyver, Vasiljevic, Weick

Developmental Science (DevSci)

Cognitive Neuroscience (CogNeuro)

Quantitative Social Psychology (QSP)

Research Centres

Developmental Disorders (DevDis)

Learning and Memory Processes (LAMP)

Durham Centre for Imaging (DCI)

Centre for Vision and Visual Cognition (CVVC)

Forthcoming: Behavioural Science

Within the department

Outside the department

Research Institutes & External Centres

*Wolfson Research Institute for Health and Wellbeing (WRIHW)

Biophysical Sciences Institute (BSI)

Institute for Advanced Study (IAS)

*Institute for Medical Humanities (IMH)

*Behaviour Ecology and Evolution Research (BEER)

*Centre for Art & Visual Culture (CVAC)

Durham Cultural Evolution Research Centre (DCERC)

Durham Research Methods Centre (DRMC)

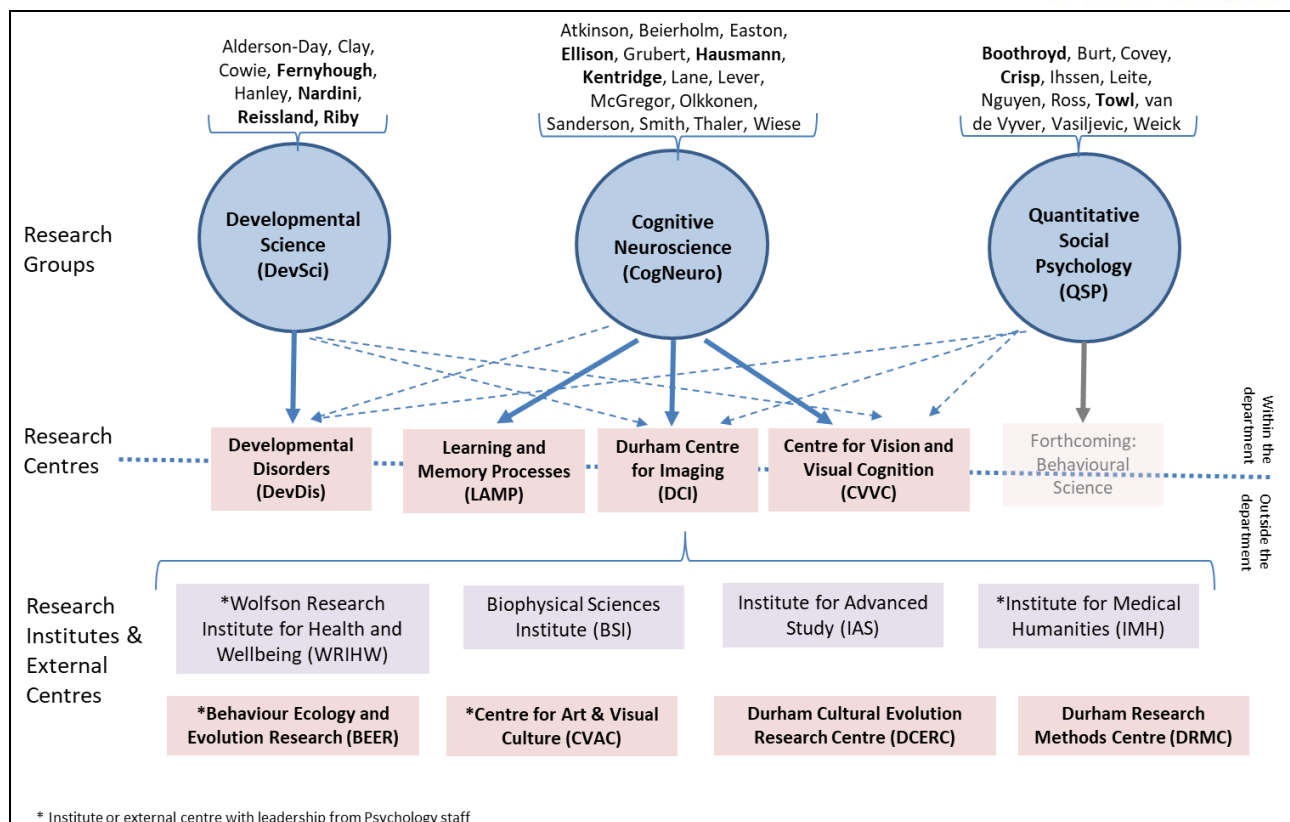* Institute or external centre with leadership from Psychology staff

Figure 1. Schematic of research group and centre structure. Senior (professorial) staff in each group in bold.

1.2.1 Developmental Science (DevSci)

DevSci comprises researchers investigating the **developmental and phylogenetic origins of perceptual, cognitive, and social abilities** using cutting-edge methods, including immersive virtual reality and motion capture, eye-tracking, thermal imaging with infants and primates, and foetal imaging. The group's research includes close collaboration with cutting-edge software companies and stakeholder groups (see 5B.4.3.1). They run a fortnightly lunchtime seminar series for staff and PGRs. **Key future priorities** are new appointments to expand research on infancy, into social behaviour (strengthening connections with QSP), with neuroimaging methods (strengthening connections with CogNeuro), and to consolidate the group's expertise in Developmental Disorders.

DevSci hosts the **Centre for Developmental Disorders**, bringing together researchers, charities and stakeholders in a range of developmental disorders from across the North East and around the UK. This centre particularly facilitates interactions with Education.

Additional strong cross-faculty and cross-disciplinary links include key collaborations with; Computer Scientists on children's adoption of virtual bodies and environments; Health Psychologists on early (foetal) health and socio-cognitive outcomes; and Anthropologists on comparative and cross-cultural perspectives on affective processing. This latter collaboration was critical in the capture of €1.5M ERC funding by Clay.

1.2.2 Cognitive Neuroscience (CogNeuro)

CogNeuro places cognitive neuroscience as the fundamental discipline for understanding the mechanisms of behaviour and brings together all those working on the neural basis of cognition from computational, experimental and animal behaviour perspectives. Their research focuses in particular on **Spatial Cognition**, **Learning and Memory**, **Attention**, and **Perception.** They utilise a range of neuroscience techniques including traditional cognitive neuropsychology, TMS, EEG and fMRI, molecular neuroscience, extracellular electrophysiological single-unit recording and lesion studies in rodents. The group leads on impact and engagement around Dementia, Epilepsy (see discussion of NEURACLIN in S4), stroke (see ICS1-DREX) and blindness, and

improvements in use of animals in research (NC3Rs). They have strong links with the NHS, industrial partners such Cambridge Research Systems and charitable organisations such as the Alzheimer's Society, the Stroke Association and PSP Association. Group members regularly organise workshops and meetings that bring world-leading scholars to Durham (e.g. ORCA 2016, Probabilistic Brain 2018, NEURACLIN), and co-hosted an international meeting on Cognitive and Motor Processes in Spatial Attention in 2019.

CogNeuro hosts the **Durham Centre for Imaging (DCI)**, the **Centre for Vision and Visual Cognition (CVVC)**, and **Centre for Learning and Memory Processes**, each of which are linked with key university facilities (the MRI scanner, CVVC laboratory unit, and Life Sciences Support Unit respectively).

Key future priorities for CogNeuro are to recruit technical and theoretical expertise in neuroimaging and behavioural neuroscience which bridges the sub-areas of the research group and further strengthen inter-disciplinary connections to both DevSci and QSP.

1.2.3 Quantitative Social Psychology (QSP)

QSP is concerned with understanding and influencing social behaviour. Their research expertise covers basic and applied **inter-group attitudes**, **health and wellbeing**, **social cognition**, and **cross-cultural research**. Research methods are diverse including: behavioural experiments, neuroimaging, developmental studies, and fieldwork conducted with businesses and special populations, such as UK prisoners and rural Nicaraguan villagers. The group has established an integrated psycho-physiology and virtual reality lab, and a 'bar lab' (5B.3.3), has invested in software benefiting the whole department (SONA, Qualtrics: 5B3.2) and runs monthly group meetings and an annual (paid) undergraduate internship. The particular strength of the group in applied research has been recognised through awards for work on self-injury/suicide in women's prisons (Towl), terrorism and social attitudes (Van de Vyver), and e-cigarette advertising and alcohol labelling (Vasiljevic). **Immediate future plans** include establishing a new Centre for Behavioural Science, and a Behavioural Science Clinic to facilitate translational research and user engagement.

1.2.4 External Centres and Research Institutes

Staff are additionally involved in external University Research Centres and Institutes (Figure 1; 5A.2.2), many of which are led or co-led by Psychology staff (Ellison director of WRIHW; Fernyhough co-founder and Research Developmental Fellow for IMH, Alderson-Day on steering group; Kentridge Co-Director of CVAC; Boothroyd steering committee of BEER; plus nine themes/special topics led by Psychology staff across WRIHW, BSI and IAS). These activities are critical to our interdisciplinary strategic goals (below) and build connections across departments to support excellence in both research and impact. The WRIHW and BSI for instance, have provided funding and networking opportunities for staff at all levels. Notably, **two of our impact case studies (ICS1-DREX and ICS2-Voices) were developed from Special Interest Groups and research streams within the Wolfson** (Stroke, and Medical Humanities respectively) The emergent **Institute for Medical Humanities** then remained critical to the interdisciplinary nature and success of Hearing the Voice.

BEER and DCERC have enhanced the comparative and evolutionary work in the department and attracted prominent rising stars in primatology (e.g. Clay and her PDRA Krupenye). DCERC in particular was critical in the success of Clay's ERC, Templeton and ESRC grants, which brought nine researchers (postdoc/PGR) into the department. CVAC has not only forged connections between Psychology and Archaeology in particular, but also sponsored joint talks, and provided PGR funding through the Leverhulme doctoral training centre of the same name. Finally, DRMC has been critical in our emerging staff training programme (5B.2.1.2).

1.3 Research governance and integrity

Our management structure is designed to support and enhance our research and impact strategy. Those committees with remits relating to research are summarised in Table 1.

Research strategy and policy are developed by the **Director of Research**, with input from the Head of Department, **Director of Impact** (see below for further detail on this role) and members

of **Research Committee**. This committee is constituted to ensure that staff across the department are represented via Research Group leaders and research/PGR/technical representatives, while centre directors and institute representatives support the integrative priorities of the department. The Department's **Strategy Group** ensures research and impact strategy is harmonised with education strategy and feeds research priorities into staffing plans. All decisions made on these committees are subject to further consultation and approval by the Board of Studies, consisting of all academic staff and representatives of other staff and student groups.

Table 1. Relevant committees within the department (chairs bolded).

	Members	Remit
Strategy group	**Head of Department,** Director of Research, Director of Impact, Directors of Education, Director of EDI, DCI (MRI) rep, ECR rep, Research staff rep, Student reps. **Professional services:** Department Administrator, Senior Research Administrator, Technical Manager	High level strategy discussion with recommendations to Board of Studies. Ensuring teaching and research strategy development is coherent. Staffing strategy.
Research Committee	**Director of Research,** Director of Impact, Research Group Leaders, Directors of Centres, Director of Postgraduate Research, Research Staff rep, Chair of OSWG **Professional services:** Senior Research Administrator, Technical Manager	Research strategy and policy. Approving research leave. Supporting strategic equipment applications. Distributing internal research/equipment funds.
Open Science Working Group	**Chair,** Durham Research Methods Centre rep, + 3 academic staff, 2 PGR reps	Assessment of current practices and skills shortages, development of training and departmental initiatives.
Ethics committee	**Chair,** HoD, Human Tissue coordinator, PGR rep, +8 academic staff **Professional services:** Health & Safety Coordinator, Senior Research Administrator +3 external members	Assessment and annual audit of ethics applications. Development of ethics policy. GDPR training/reporting.
EDI Committee	**Director of EDI,** HoD, 7 academic staff, Research Staff Representative, Student representatives **Professional services:** Department Administrator, Secretary	EDI audits, policy and initiatives across the department. Athena Swan submission.

1.3.1 Open science and reproducibility

In 2019, the **Open Science Working Group** (OSWG) chair joined Research Committee to ensure that both reproducibility and open research practices are explicitly considered during policy and resource decisions. Department surveys in 2019 and 2020 showed good early engagement in reproducible analyses and more open publication practices (see Figure 2) but also identified key areas for development which the group is now targeting (see Section 2: training). Staff can use Research Committee funds to support Gold Open Access publication where UKRI block-grant or other funds are unavailable (51% of the department's 2014-20 outputs are Gold Open access). A key priority is to now develop a departmental reproducibility policy, and to identify how we can further support good practice.

Figure 2. Open and Reproducible Science Practices Within the Department
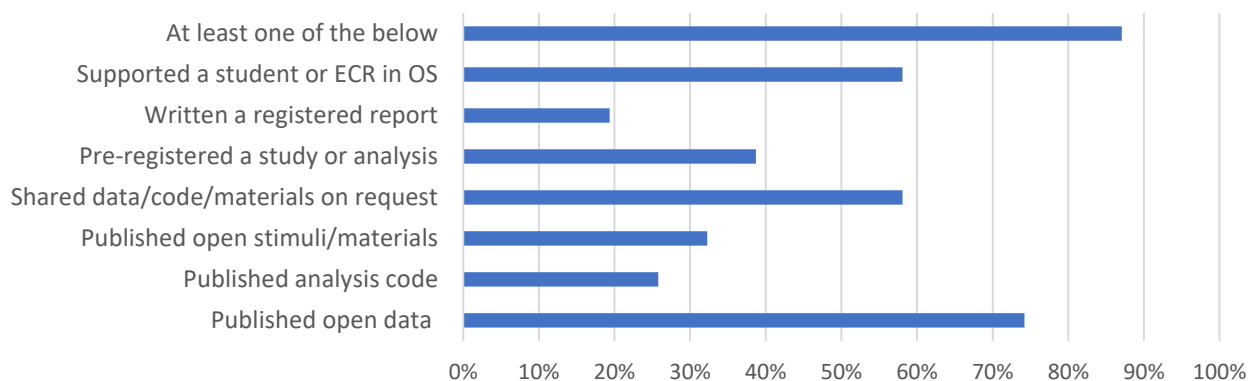
1.3.2 Ethics

Institutional approval of human research is granted by the **Ethics Committee** for all staff, postgraduates and undergraduates, using the university's dedicated online system, which allows easy tracking of revisions, annual audits, and completion reports. The committee has organised departmental training in key aspects of research governance, including the Human Tissue Act, GDPR and ensuring participant safety when data is made open. We have also secured an ESRC *SafePod* in the main Library for sharing sensitive data. The Committee recently developed policies to support our increasing levels of research in distant, low/middle-income countries, including remote working guidance, and informed consent protocols for participants with low levels of literacy. Research on non-human species in the department is subject to Home Office licensing and institution-level review (5A.2.3).

Table 2. Goals in 2014 Department Plan	Evidence of success	
"research focussed within a small number of research groups of international standing"	New group structure	5A.1.2
"increase PGR numbers"	60% increase 2014 vs 2020	5A.2.2
"compete more effectively for research income"	> doubled total income over REF period	5A.3.1
"collaborative, interdisciplinary research with Institutes, international partners, industry and the public sector"	Increased commercial funding; international visiting fellows; international publications; stakeholder collaborations	5A.3.1 5A.2.1 5A.4.1 5A.4.3

1.4 Strategy

The department's integrated research and impact strategy is built around the recognition that interdisciplinarity is the best route to meaningful real-world effects and that supporting the development and research goals of academics increases both quality and resilience in research outcomes. In order to meet and move beyond our strategic goals from 2014 (Table 2), we therefore adopted a three-pronged approach of: building the foundations for interdisciplinarity, supporting staff to acquire the skills and funding for excellent research, and broadening and rewarding staff engagement in impact.

1.4.1 Building interdisciplinarity

Psychology is inherently *multi*disciplinary which provides rich ground for *inter*disciplinarity across subjects. Our goal has been to first create the building blocks of that interdisciplinarity within the department, second foster cross-group links, and third reach outwards to other departments and institutions.

Progress 2014-2020:

- A vital step in interdisciplinarity was to create **a more balanced research profile, encompassing a broader range of psychological science**, achieved by developing the Quantitative Social Psychology group, to sit alongside our existing strengths in Developmental and Cognitive Neuroscience.

- We doubled the number of **Research Centres**, to further increase routes for interdisciplinary collaboration across and beyond the department. We also broadened the DCI to incorporate facilities in Sports Science and supported staff to increase their involvement in **Institutes** (see above/5B.4.1).

- **Investment in shared research facilities**, with spending on space and equipment prioritising those which support collaborative use (see e.g. discussion of VR 5B.3.3.2).

- **Embedding interdisciplinarity into the department's events and processes**; for instance, our annual 'research away day' and departmental seminar series present research from/speakers nominated by all research groups, and include explicit interdisciplinary sessions. For PGRs, all application assessments, progression reviews and mentoring arrangements involve members of staff from at least two research group (see 5B.2.2 below), and our workload model recognises co-supervision of students across academic departments.

Plans 2020-2027:

- We are forming a whole-university participant pool for behavioural research (lead: Weick), under the auspices of the Durham Research Methods Centre.

- Projects under the banner of the IAS will develop new connections between Psychology and English (leads: Easton, Alderson-Day).

- To consolidate the above, we will establish a Research Centre for Behavioural Sciences, hosted by the QSP group, to act as a nexus for behavioural research across the University and beyond. Scoping workshops with colleagues from the Business School, Computer Science, Sociology, Education, Music, and Sport and Exercise have demonstrated significant appetite. Emerging cross-departmental funding bids (e.g., EPSRC – Ellison; NERC – Beierholm, Covey, Vasiljevic, & Weick) attest to the potential of the new centre to provide a hub for interdisciplinary research at Durham.

1.4.2 Supporting excellent research

We are committed to facilitating the production of high quality and innovative research through: recruitment and training, ensuring critical mass of staff and PGRs within groups, and investment of resources into all stages of the research process from project formation and grant capture to publication.

Progress 2014-2020:

- Developed **core research group structure** (above) to enable targeted peer support and collaboration.

- Expanded **staff and researcher development** including targeting new and emerging issues and techniques, and enhanced mentoring and research leave offer (5B.2.1).

- Developed specific policies around application auditing, within- and between-group peer review, proposal-writing training, and use of existing internal expertise on grant panels, to support **research income capture** (see 5B.3.1), resulting in notable success including large ERC, Wellcome and NIHR awards and more than doubling our total income vs last REF.

- **Increased by 50% the sums staff can request from Research Committee to support research development**, including pump priming, network development, international travel, publication fees, and hosting potential research fellows. Research and teaching fellows have also been given access to these resources to support their career

development. Notably, this budget has been protected from COVID-19 related cutbacks. As discussed below (2.1) these steps have resulted in, amongst other outcomes, attracting our first independently funded fellows since 2005 and excellent fixed-term staff career destinations.

- Using the department's share of overheads from research grants under the university incentivisation scheme (5A.4.2) to **increase discretionary spending for all academic staff**, in recognition of the collective collegial efforts in peer review above.

- Formation of the **Open Science Working Group** (see above/Section 2).

Plans 2020-2017:

- **Further increase independent fellowships**; we already have two UKRI applications going forward and one NENC ARC fellowship starting in AY2020-21.

- Continue supporting staff to win larger UKRI and charity grants through our funding strategy (5B.3.1) and **expand consultancy income** in line with our impact strategy below.

- **Further develop our policies on reproducibility** and broader research methods training for existing staff.

1.4.3 Enabling impact

Progress 2014-2020:

Our approach to impact has changed radically during the assessment period. In 2014, one 'catch-all' research group (Applied, Clinical and Health), then based at our secondary campus at Stockton-on-Tees and poorly integrated into the remainder of the department based at Durham City, delivered the bulk of our impact strategy. The site merger, however, facilitated **the integration of application and impact into all of our consolidated research groups** and the development of a research environment in which **all three groups contributed an ICS to the current submission**. Alongside institutional level initiatives (5A.4.4), we have used structures, policies and our staffing strategy to support all staff in identifying and realising the potential applications of their research. In particular we:

- **Created a Director of Impact** in 2014 who: offers 1:1 support to all staff on the development of their impact programmes; mentors Impact Case Study leaders; makes links between staff and the University's central research impact support officers, impact funding schemes, and broader academic community, paving pathways to implementation.
- **Built increasing relationships with external stakeholders** by:
  - **appointing staff with prior commercial backgrounds** (Leite: deLoitte) **and networks** (Crisp, Van de Vyver, Vasiljievic, Weick);
  - expanding our Centres and Institutes, and additional stakeholder/clinician networks (see 5B.4.2.1);
  - appointing a Professor in Practice co-hosted by the WRIHW;
  - developing new partnerships (e.g. Channel 4).
- **Invested in research infrastructure which increases ecological validity** (see the 'Bar Lab' and VR in Section 3), to bridge the gap between controlled experimentation and real-world behaviour.
- Adjusted policies to **recognise staff effort in impact delivery and ensure sustainability**, via our workload model, research leave policies, and departmental funding for impact development to complement University and ESRC Impact-Acceleration funds. All ICS leaders benefitted from department resources and ICS1-DREX and ICS3-PrisonSuicide received impact-focused research leave in the current period.

Outcomes and plans 2020-27:

Our staff have, as a result of these changes, been supported to develop impact through three key approaches which we will now carry forward:

- **Those doing basic science are now aware as early as possible, via the Director of Impact and our Research Centres/Institutes, of key stakeholders and downstream outcomes**. This is exemplified in **ICS1-DREX**, where basic research into visual attention has formed the basis for iterative co-design with NHS, stroke patients and carers, of a therapeutic tool.
    - o **Next REF period** we will see impacts arising from multiple projects won in the current period with this kind of impact built in (e.g. McGregor: ESRC, navigation and fire evacuation; Thaler: BBSRC, echolocation training for the blind).
- **ICS2-Voices** took a step further by **treating stakeholder experiences as the research question itself**. This involved using interdisciplinary approaches (with English, Medical Humanities and Sociology, facilitated by the WRIHW) to co-create subsequent directions of research and has resulted in both empirical work on interventions, and commercial impacts (e.g. NinjaTheory's successful *Hellblade* game).
    - o **Next steps are** to continue supporting others to take this approach; e.g. Boothroyd's Wellcome award on eating attitudes in low-income countries; Hanley & Riby's work on anxiety in Williams Syndrome.
- Finally, Towl's **pre-existing background in a key stakeholder organisation** (as former head of UK Prison Psychology) was critical to him conducting the quantitative research underpinning the Harris Report and subsequent policy changes discussed in **ICS3-PrisonSuicide**. This shaped our decision above to recently appoint more staff with similar backgrounds or connections, and has already resulted in new public reports (Van de Vyver: e.g. Durham Respect Commission), spin-out commercialisation (Crisp: TheParticipantHub) and collaborative projects with ESRC-IAA funding (Weick, Vasilevic).
    - o **Next we plan to facilitate further consultation and stakeholder-led work** through the planned Behavioural Science centre, by establishing a Behavioural Science Clinic for commercial and third sector clients in 2020-21, and targeted recruitment of a further Professor in Practice.

Section 2. People

2.1 Staff

The department has 35 academic staff (34 FTE, see Figure 1 for groupings) with an average age of 43. A breakdown of academic staff by gender is shown in Table 3. The comparatively low average age, unchanged since 2014, reflects our ongoing strategy of replacing retiring and departing (and sadly in three cases, deceased) staff with high calibre early career academics.

Table 3. Breakdown of Cat A staff

|	Female		Male	
	N (FTE)	mean age	N (FTE)	mean age
Professor	4 (4)	50	6 (5.7)	52
Associate	6 (6)	42	10 (10)	46
Assistant	6 (5.3)	36	3 (3)	41
Total	16 (15.3)	40	19 (18.7)	47

Thirteen academic staff were appointed this current REF period (8 women) including seven current members of the QSP group. Five staff are already due to start AY2020/21 (2 women). In line with University strategy (5A.3.1), we pursued wide-ranging international searches; 45% of current staff hold overseas/joint nationality. Having established three broad pillars of Psychology this REF period, we will continue to recruit across all three areas in a way which maximises interdisciplinary collaboration with new posts supported by resilient student numbers.

We currently have 11 members of research staff out of 23 in total this REF period (including two independent fellowships; Dachtler: Alzheimer's Society; Martin: DiFerenS2). We have also hosted three Senior Research Fellows on 6-month visiting fellowships (South, BYU; Christensen, Australian National University; Alba-Ferrara, NSTRC Argentina) and six 2-month IAS fellows including Smithson (Oxford), Arciuili (Sydney/Flinders), Halpern (Bucknell).

Research in the department is supported by the Department Manager, the Senior Research Administrator and the Postgraduate Research Coordinator (all women), and three technicians (1 woman).

Figure 3. Cat A and PGR Numbers 2014-22
Projected FTE based on contracts issued for 20/21 and posts approved for 21/22
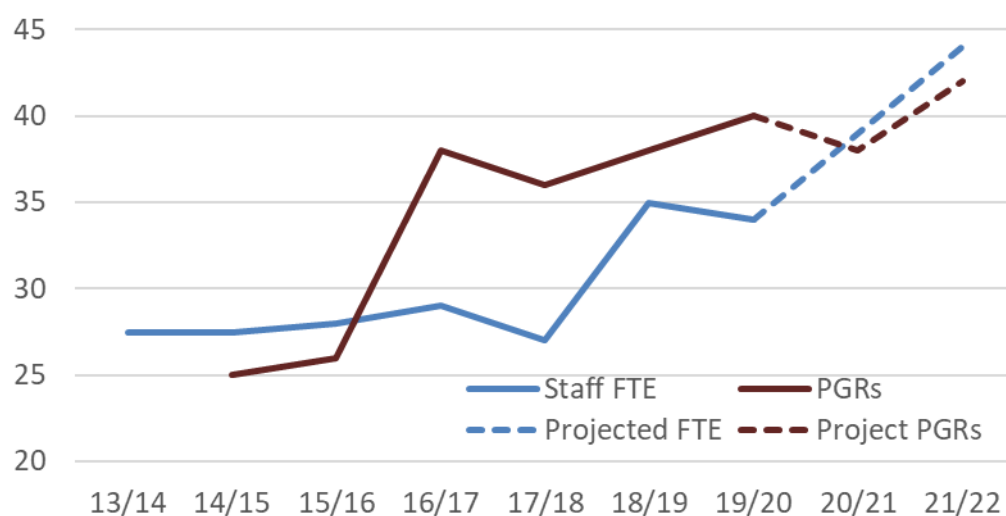
2.1.1 Research Leave

A key factor in support for staff has been a significantly more attractive Research Leave offer. Prior to 2016, teaching needs (particularly given the split site) meant Psychology staff were only

permitted to take one term at a time and teaching was moved into the other term. As such few staff took leave as nine weeks relief was considered too costly in the other term. Since 2016 however, staff can accumulate their earned leave allowance (see 5A.3.3) and **take two consolidated terms including the Summer term or in special circumstances a full year of research leave**. This was facilitated by shifting to single-term/co-taught modules to increase workload flexibility; project supervision is also undertaken pro-rata during that year. As a result, in 2017-20, thirteen staff have taken research leave, resulting in grant success (e.g. Nardini: ERC), major publications (e.g. Boothroyd: JPSP; McGregor: JEP:G) and impact development (e.g. Towl: ICS3-PrisonSuicide).

2.1.2 Training and Development

Staff development operates at a number of levels and with different focuses. Broadly, we provide support at individual, group and department level.

Individual staff members meet a **mentor** regularly during probation (academic staff), and continue to receive at minimum an annual mentoring meeting (all staff) focused on progression feedback from the University's newly transparent **Promotions system** (5A.3.2). This helps individuals identify training needs, additional mentoring needs, and administrative and leadership opportunities to further their personal development. As a result, staff have self-selected onto training provided by the university (e.g. Research funding workshops aimed at ECRs, leading research courses for first time PIs, training for senior leadership, PI health and safety, working with the media, PGR supervision, and data management) and external courses (e.g. Aurora/Leadership Foundation training, multilevel modelling, agent based modelling, Future Founders commercialisation programme, and specialist software/techniques such as VR with eye-tracking, online testing platforms, functional sonography and brain imaging software).

Research groups have budgets for topic and methods focused training in a manner which is flexible to the needs of group members. **Consolidation of our core research groups has increased these activities in the current REF period** (e.g. five 1hr meetings across all groups AY2012/13, vs c.20 in AY2019/20). These have included domain-specific seminars led by postgraduates, staff and external speakers; workshops with external speakers to support e.g. impact delivery, grant capture; and grant 'pitch to peers'. These are also complemented by smaller 'lab group' journal clubs which may cut across groups (e.g. Nardini/Beierholm: Cue integration; Boothroyd/Clay: cultural & comparative).

Whole staff workshops, introduced in 2016, focus on particular issues of benefit to all research active staff and PGRs including: writing high impact publications, grant capture with UKRI and the ERC, GDPR and data management, technical support, grant costings, large scale multi-lab research (e.g. the Psychological Science Accelerator), and newly acquired platforms such as *Qualtrics* and *SONA* participant management software. This has been recently enhanced by the **Open Science Working Group** which has run a Summer School on statistical programming language R and data visualisation (in collaboration with the Research Methods Centre) and workshops on Bayesian analysis and Pre-registration. The group also runs a fortnightly journal club covering e.g. effect sizes, power analysis, pre-registration plans, and evaluating evidence. This has allowed us to build on and consolidate our growing expertise and experience in this domain, with 84% of staff engaging in at least one form of Open Science practice (see Figure 2).

Research incentivisation funds also contribute to staff development. Commencing AY 2018-19, the university returned 20% of net grant overheads to departments to facilitate strategic research goals. The department used these funds to develop i. an 'ECR studentship' to provide junior colleagues with additional opportunities to develop supervisory experience, and ii. as noted above (5B.1.4.2), provide staff with £500 additional research budget a year for strategic activities including research costs, publication costs, training and networking.

In total, 62% of current staff report having attended some form of writing, methods or statistics training provided by the department in the last three years, in addition to University and external training.

Evidence for the success of our strategy can be seen through

i.   examples of staff taking/moving to senior leadership roles (e.g. Ellison: WRIHW; Riby: ESRC NINE-DTP Director; Eacott, now PVC at Essex);

ii.   high rates of promotions of staff in the last 2 rounds (seven to associate professor, seven to professor),

iii.   retention of previously appointed young academics (e.g. 40% of staff and half of our professors held their first permanent post at Durham)

iv.   the dramatic increase in grant capture including amongst younger colleagues, with 88% of all current staff having been a PI or Co-I since 2014.

Importantly, our staff development opportunities are attended by research staff and teaching fellows, who can also access research committee resources to support the development of their research and careers beyond the scope of their contracted role. This contributes to the majority of these staff then winning permanent academic posts here and elsewhere (Figure 4).
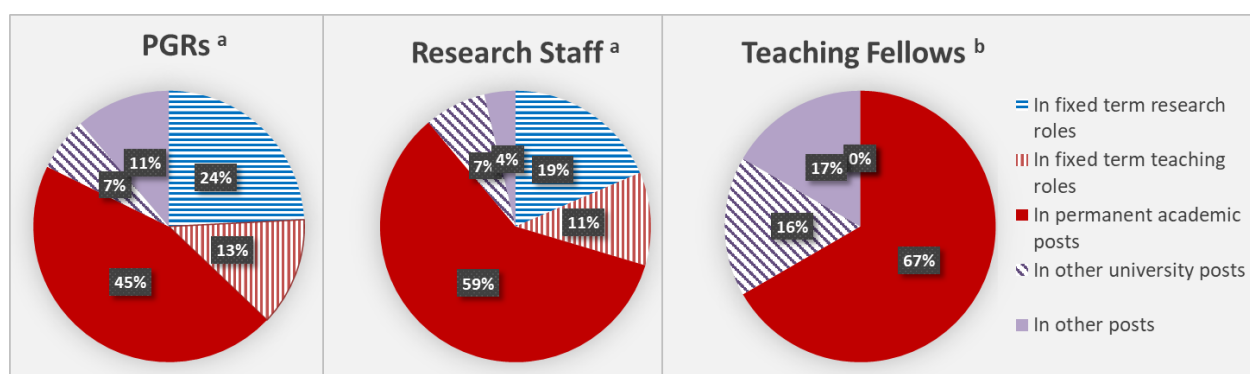

Figure 4 Current roles of former students and fixed term staff as of April 2020. (a. Based on survey of PIS/Supervisors April 2020; b. Based on verified roles for all TFs whose contracts ended Jan 2014 – April 2020.)

2.2 Postgraduate Research

44 PhDs (37.8 FTE) were successfully completed 2013-14 to 2019-20 with 40 students currently registered for research degrees following a significant increase in registrations across the REF period (see Figure 3).

Our students have received funding from a broad range of sources including the department, the university, UKRI (ESRC, MRC, GCRF) and NHS, charities such as Leverhulme, NC3Rs, Templeton Foundation, and the Baily Thomas Charitable Trust, commercial companies such as Proctor and Gamble and Channel 4, the European Research Council, and overseas governments (e.g. Brazil, Indonesia, Malaysia, Mexico, Saudi Arabia, Taiwan and Turkey). Students also receive in-kind support through collaborative studentships with companies (e.g. VICON, and 3rd Sector bodies (e.g. Bare-Toed Dance Company).

We achieved our dramatic increase in PGR numbers across the current REF period (Figure3) by i. increasing commercial partnerships and winning external funds which include PGRs, ii. providing staff training in UKRI training centre applications, and iii. advertising project outlines to attract strong candidates who can more successfully compete in faculty and external funding competitions. We are therefore in a strong position to significantly increase our number of completed research degrees in the next REF period.

The Department plays a strong role in supporting postgraduate research across the social sciences at Durham and in the region; Riby is director of the ESRC NINE Doctoral Training Partnership covering North East England and Northern Ireland. Furthermore, our taught MA Research Methods provides research training for ESRC funded students. This includes students in other pathways who take our Applied Statistics course as an essential component of their training.

2.2.1 Support and training

All students have an **annual skills review** with their supervisory team, to direct their development. Alongside central provision (5A.3.5), all departmental workshops above are inclusive of PGRs; students are actively involved in all research groups, centres, and the Open Science Working Group. In addition to their supervisory team, PGRs each have a gender-balanced review/mentor team who offer support to ensure their yearly progression. In line with our interdisciplinarity strategy these reviewers are from different research groups and provide not only another perspective on the doctoral research but can support employability development and open up wider academic networks.

All PGRs are supported via **Postgraduate Education Committee** to attend at least one international conference over their PhD, in addition to a national conference each year. Students are encouraged to present at these conferences to build vital presentation skills. The committee also awards funds to cover additional research costs as students' projects develop.

Postgraduate students have built a **vibrant community** within the department. As well as general social support, with weekly coffee in their new common room, the students lead their own 'PGTips' seminar series in which speakers are invited to deliver talks on general aspects of the research process, careers, wellbeing, and methodologies. They also organise an **annual postgraduate conference** at which students give talks and posters, alongside notable keynote speakers such as leading women in neuroscience (Hurlbert), pioneers in large scale and open science practices in Psychology (Jones and DeBruine), and winners of BPS researcher awards (Slocombe).

The strength of this community and both departmental and institutional support has been externally recognised through **research prizes** (Ridley: PsyPAG Masters Research award 2019), **early career keynote addresses** (McDougal: Neurodevelopmental Disorder Annual Seminar 2019), **conference prizes** (Best poster PsyPAG: Keenaghan) and **book contracts** (Horsley, Thomson, Kuay).

Our postgraduate students thus enter the workforce with highly desirable track records and skill sets. The vast majority of our PGRs stay in academia (Figure 4) while the majority of those who leave enter clinical training.

2.3 Equality, Diversity and Inclusiveness (EDI)

EDI is at the core of all strategy within the department. Our Department includes leading international academics on key EDI issues such as intergroup relations (Crisp; Leite; Van de Vyver), neurodiversity (Riby, Hanley), aging (neurodegeneration: Lever), and at-risk populations (Towl). Furthermore, staff have led on university-level reports which have recommended institutional policy and practice changes in regard to mentoring (Boothroyd), sexual misconduct (Boothroyd, Towl) and respect at work (Van de Vyver). The **EDI committee** (Table 1) meets termly, with the EDI lead (Reissland) a core member of department management, and EDI issues are explicitly considered under a standing agenda item at all other department meetings. Policy development must consider EDI impacts before implementation. Since 2014, the department has taken a number of steps to enhance EDI including:

- targeting networks representing women and BAME academics during staff recruitment searches, resulting in more offers to these groups (offers AYs2017-20: 70% women, 25% BAME),
- introducing a policy of enhanced research funding support alongside the guaranteed research leave for staff returning from maternity/parental leave (5A.3.3), with flexibility around research leave also granted on an *ad hoc* basis for those with disabilities or other caring responsibilities;
- ensuring staff on parental leave can access research funds for KIT days;
- ensuring that workload is allocated pro-rata to staff taking parental leave within a given academic year (ending the practice of compressing full-loads into one term);
- funding an EDI Studentship for academic research into topics on diversity and inclusion;
- allowing research funds to be utilized to support travel with dependents for staff and PGRs;

- adapting our new building for a wheelchair using PGR student;
- creating more representative and inclusive management structures and processes (e.g., strategy group includes ECR, teaching track and support staff representatives; weekly HoD coffee 'drop ins', policy documents posted for comment on Blackboard, standing open-invitation to all staff for all departmental committees).

During this REF period, 4 academics have taken maternity leave and all returned to work full time, supported by the policies above. **Leadership roles within the department are allocated in a manner which aligns with EDI objectives**, and are supported by both internal and external leadership training (as discussed above). The department had its first female Head during the present REF period, and at present half of senior roles in the department are held by women, including our Director of Research (Boothroyd), Director of Impact (Ellison), Director of EDI (Reissland), Technical Manager (Stanton) and Departmental Manager (Loughlin). Furthermore, three of four Research Centre leads are women, while two centres have earlier career academics as directors (Olkkonen: CVVC) or co-directors (Olkkonen/Ihssen: DCI).

The strength of our policies and practices with regards to EDI in the current period have been recognized with **two Silver Athena Swan awards**, and their success in effecting real change in the academic careers of our staff is reflected in the fact that our submission includes outputs from women (50.5%) and BAME staff (7%) which exceeds their representation in the department (45% and 5.9% respectively). 53% of outputs were also authored by parents/carers of young children (<11yrs). Likewise, although we started 2014 with only two female professors (now a PVC/deceased respectively), we currently have more female professors than ever before (four), all of whom were promoted internally in the last two years following time spent in departmental and faculty leadership positions, and two of whom have been in the department since their first academic appointment (Boothroyd/Ellison). Similarly, our recently promoted professors include at least one disclosed case of mental health disability.

Section 3. Income, infrastructure and facilities

3.1 Income

The department has experienced a significant and sustained increase in research funding compared to the previous REF period (see Figure 5), with our peak of c.£1.4M in 2018 being more than triple our annual income just four years earlier and total income across the period more than double last REF. Our income includes major programmatic awards (e.g. Fernyhough (PI) and Alderson-Day, Wellcome: total value to University £2.9M 2015; Riby (Co-I) NIHR: total value £1M 2017; Clay ERC: €1.5M 2018; Nardini, ERC: €2M 2018), substantial UKRI and Leverhulme funds, and a range of charity and overseas grants. Likewise, our commercial research income includes both long-term partnerships such as with Channel 4 and Procter and Gamble, alongside grants and consultancies. In total 88% of current staff have held research funds in this period (94% excluding those appointed to first post in the last year).
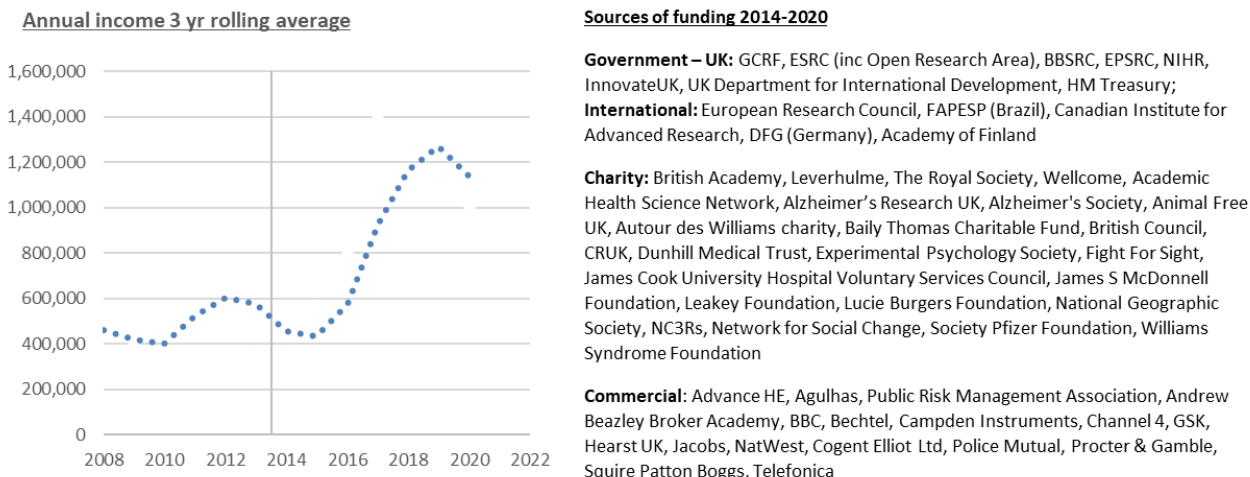
3.1.1 Income strategy

The department views income as the foundation for excellent research and has significantly increased investment in income capture during the assessment period. Individual discussions with staff during DPPC feedback identify necessary resources for their plan of research and what applications they therefore plan to submit, with financial, development and workload support provided as needed. Staff are encouraged to apply to the schemes best suited to their research needs, regardless of FEC/overhead position; a fact attested to by our good income from charities as well as UKRI sources.

Structure and policies at University and Department level support the development of high-quality proposals. All **staff have discretionary allocations of £1Kp/a** (plus £500 in AY2019-20 under the department's research incentivisation budget discussed above) and **Research Committee awards c. £16Kp/a** via light-touch applications; this allows staff to focus funding efforts on larger projects. The University grants **Seedcorn Awards of up £25K** for development of major research programs (5A.4.1), and Research Committee funds can cover up to £750 per application for pump priming, and another £750 to conduct additional pilot work for resubmission of well-reviewed but unsuccessful bids.

The University has expanded professional support for grants (5A.4.4); **Research Operations** work with staff in application and post-award phases, while the **Research Development officer** runs funding workshops for new staff and supports individuals (typically directed to her by the Director of Research) in developing and targeting funding bids for major programmes (see e.g. our Wellcome success and two current UKRI Future Leaders applicants). UKRI Pathways to Impact, Impact Acceleration funding bids, and external commercial/translational bids are also supported by the Director of Impact and central **Impact Development Officers**.

Peer review of grants is enhanced at all stages of proposal development through the UKRI liaison groups, our Research Groups (who provide specialist reviews) and Centres (which facilitate end-user and interdisciplinary perspectives), with multiple rounds of mock interviews for major funding schemes (e.g. ERC, UKRI-FLF, Wellcome Collaborative Awards). The **Director of Research audits peer review and resource planning** during the application approvals process, with additional training and best-practice workshops planned on a responsive basis. Finally, **research leave** can be used to strategically support applications. For instance, Nardini's recent £1.8M ERC grant was developed during a period of targeted research leave, while Boothroyd's Wellcome Seed Award was based on groundwork laid during research leave and with University Seedcorn funds.

Figure 5. Summary of income for current REF period.

Annual income 3 yr rolling average

Sources of funding 2014-2020

Government – UK: GCRF, ESRC (inc Open Research Area), BBSRC, EPSRC, NIHR, InnovateUK, UK Department for International Development, HM Treasury; **International:** European Research Council, FAPESP (Brazil), Canadian Institute for Advanced Research, DFG (Germany), Academy of Finland

Charity: British Academy, Leverhulme, The Royal Society, Wellcome, Academic Health Science Network, Alzheimer's Research UK, Alzheimer's Society, Animal Free UK, Autour des Williams charity, Baily Thomas Charitable Fund, British Council, CRUK, Dunhill Medical Trust, Experimental Psychology Society, Fight For Sight, James Cook University Hospital Voluntary Services Council, James S McDonnell Foundation, Leakey Foundation, Lucie Burgers Foundation, National Geographic Society, NC3Rs, Network for Social Change, Society Pfizer Foundation, Williams Syndrome Foundation

Commercial: Advance HE, Agulhas, Public Risk Management Association, Andrew Beazley Broker Academy, BBC, Bechtel, Campden Instruments, Channel 4, GSK, Hearst UK, Jacobs, NatWest, Cogent Elliot Ltd, Police Mutual, Procter & Gamble, Squire Patton Boggs, Telefonica

3.2 Infrastructure and computing

The department currently occupies 1814m^2 across two adjacent buildings. All academic staff have their own offices, while other staff and postgraduate researchers have their own desks within shared offices. While we previously had minimal capacity for social space, there are now dedicated staff, postgraduate, and undergraduate common rooms, with integrated or adjacent kitchen facilities; these spaces are also used to support journal clubs and lab meetings. Staff and PGRs are supplied with their own personal computers (upgraded every 4 years) and access a wide range of generic and specialist programmes through the University's 'AppsAnywhere' system. This includes statistical and analytical packages (e.g. AMOS structural equation software, Jamovi, JASP, RStudio, SPSS, Stata; NVivo), programming (MATLAB with plugins) and simulation programmes (Rescorla-Wagner simulator). The department also supports staff to purchase individual licences as required (e.g. MPlus/Stata for statistical analysis; Inquisit Web for online experiments; Observer for video coding).

The University provides access to high-powered computing facilities, and staff are also able to run their own clusters and servers to support their research. There are nine servers within the department totalling c. 90 Xeon cores and one dedicated online research server (face.dur.ac.uk). Recently, the department invested in a Qualtrics licence such that staff and students can more easily conduct online research with low levels of training required. Our student participant pool is managed through SONA which advertises studies and assigns participation-credit (which they later translate into pool access for dissertations), while our family participant pool and school contacts are managed through databases.

3.3 Research facilities

Our new building and £2M infrastructural investment, along with £173K from strategic equipment funds within the university, start-up funds, and partnerships with industry, has allowed us to significantly increase our research capacity in terms of both specialist testing spaces and equipment. 42% of the department floor space is dedicated to research. The department runs two major facilities: the MRI scanner (see below), and the Centre for Vision and Visual Cognition wing, a dedicated building of smaller testing rooms, housing a number of the laboratories discussed below. We are also, alongside Biosciences, primary users of the University's Life Sciences Support Unit. Other labs are housed in the main department buildings, close to staff offices. Access to all labs and equipment is managed through an online booking system; in line with our interdisciplinary strategy, labs are not assigned to particular individuals or groups, which allows both efficiency in use, and also increases diversity in research. For instance, the development of our first virtual reality lab was actively instrumental in increasing numbers of existing staff across all research groups developing VR projects and led directly to £102K of further university investment in these facilities. In total 40% of submitted outputs use one or more of the facilities below.

3.3.1 Neuroscience facilities

Staff continue to benefit from our 3-Tesla Siemens MRI scanner, housed at James Cook University Hospital at South Tees NHS Trust, and our department-based, full-sized mock MRI system with integrated stimulus/response systems, for technical planning, task piloting and participant familiarisation. Since 2014, the scanner has been upgraded to include MRI-compatible eye-tracking systems and real-time analysis set-ups for neurofeedback.

We have significantly expanded our EEG laboratories from one system to: a wet-EEG lab featuring two EEG systems in separate 'pods', a control bench, and washing facilities; and three dry-EEG systems including biofeedback, for ambulatory and domestic brain-computer interface research. The Wet-EEG lab was funded as part of the department's merger onto one site, while the dry-EEG equipment was funded through start-up and a grant from the BSI. These facilities have attracted EPSRC bursaries, and Leverhulme and ESRC doctoral studentships.

Likewise, our human neuromodulatory equipment, such as transcranial electrical and magnetic stimulation, have been upgraded in order to more clearly define functional and contingent networks in the brain, often in concert with fMRI. Via the DCI, we also have access to a GE DEXA scanner (dual energy X-ray absorptiometry) allowing members to assess bone density, important for sports science, developmental and healthy ageing research.

The department's strong representation in visual perception research has continued with expansion of our eye-tracking resources from 8 (6 x desk-mounted, head-fixed, 2 x head-mounted; predominantly 250Hz) to 19 systems, including faster 500-1000Hz head-free systems for high temporal resolution tracking with neurological patients; 5 eye-tracking VR headsets (see below); 2 pairs of Tobii glasses for eye-tracking during free-movement; and a screen-mounted Tobii Pro Fusion for portable work in primate sanctuaries.

Our new Molecular psychology lab includes facilities for comprehensive in-house hormone analysis, gene sequencing, antibody detection and protein expression analysis. Critically, these facilities allowed us to bring in our first independent research fellow (Dachtler, Alzheimer's Society) for over a decade, as well as enabling the department's first molecular-biology outputs (*Molecular Autism*; *Disease Models and Mechanisms*).

Our dedicated Behavioural-neuroscience space within the Life Sciences unit includes a modern surgery, histology suite, specialist holding rooms, and seven experimental labs housing specialist equipment, e.g.: Axona 128-channel electrophysiological systems for chronic recording in freely-behaving rodents in real and VR environments (with a new world-leading 2-D Virtual Reality system), a water maze, various behavioural assay mazes to test cognitive, social, and emotional behaviour, and c.20 Skinner boxes.

3.3.2 Virtual reality, motion capture and psychophysics

In 2013 the department had no VR facilities; we now have five VR laboratories, two with full body motion tracking, as well as 21 VR headsets for teaching purposes. Our large testing space equipped with the Vicon motion capture system is used both for virtual reality studies (e.g. children interacting with their own motion-synced mirror-reflection, or navigating/searching virtual environments) and for dedicated motion capture (e.g. navigation in blind echolocators). This lab was funded through £50K of University start-up funds to Cowie and Nardini in late 2013, with collaborative input from Vicon, and has brought in over £3M in external funds, three studentships, and supported seven postdocs/RAs. Most recently, the university funded a £85K virtual interaction lab with dual Vive VR, PerceptionNeuron full-body motion capture, and clinical-grade wireless psychophysiology systems, so that two participants can interact in virtual environments, while their physiological responses are monitored. Three other, smaller VR labs use Vive systems with head-tracking, to assess single individuals in virtual environments, including one system with eye-tracking, funded by strategic university funds and industrial collaboration with Channel 4. We also use a 360□ camera to capture ecologically valid scenes for use in VR environments, and retain our portable psychophysics kit for remote testing of participants.

3.3.3 Specialist testing spaces

In addition to our existing <u>anechoic rooms</u> for echolocation and sensory-integration research, the department significantly upgraded our <u>developmental laboratories</u> to include new digital cameras for observation, enhanced computing support in the observation suite, and a dedicated family waiting room. We have also retained our <u>developmental lab at Queens Campus</u> to conduct the final 18-years follow-up with the Tees Valley Baby Cohort, funded by the ESRC. Finally, we have developed two new specialist laboratories for translational research: <u>The Rowan Tree Bar Lab</u>, for ecologically valid alcohol consumption studies, and the Channel 4 funded <u>television viewing suite</u>, which resembles a sitting room.

3.3.4 Award-winning technicians

Our three full time technicians provide programming, electronics and workshop support for staff and PGRs. All three joined us in the early stages of their careers and have continuously enhanced their skill set as research in the department has expanded in its technological and programming complexity. Examples of their work in the current REF period include:

- 2-player marble-traps for children in cooperation experiments;
- the bar lab;
- ecologically valid electronic response boards (based on the Batak game) for competitive reaction time tasks;
- programming of online implicit attitude tests;
- virtual environments with live avatar tracking, including models which scale to child and adult participants;
- multifunctional, portable kinematic recording devices;
- and development of a new tool to assist with implanting microdrives for electrophysiological recording in the rat brain. This project was so successful that AXONA Ltd wanted to provide their customers with the option to buy this new 'Long Jig', which is now being used by other departments across the UK.

The skill and ingenuity of our technical team, and their vital contribution to the research environment of the department, was recognised by the **BPS Technical Support for Research Award 2019**.

4. Collaboration and contribution to the research base, economy and society

4.1 Academic networks and collaboration

4.1.1 Within the University

As discussed in Section 1, Research Centres and Institutes facilitate **collaborations across the department and the university** and are critical to our strategy of building interdisciplinarity to facilitate impact. Collectively our four Centres incorporate colleagues from Anthropology, Biosciences, Computer Sciences, Education, Engineering, Physics, and Sport and Exercise Sciences. Likewise, through the Institutes we have formed additional links with English, Theology, History, Music, and Sociology; the WRIHW alone consists of 150 fellows across the university. Furthermore, our staff support cross-university research through BBSRC and ESRC liaison committees. Resulting between-department collaborations include **jointly-supervised PGRs** (25% of those who completed this period) and major grants (e.g. Covey: Co-I with Earth Sciences on HIVE; Fernyhough: Wellcome/ICS2-Voices). Of all papers published in the department this REF period, one third had multiple Durham authors.
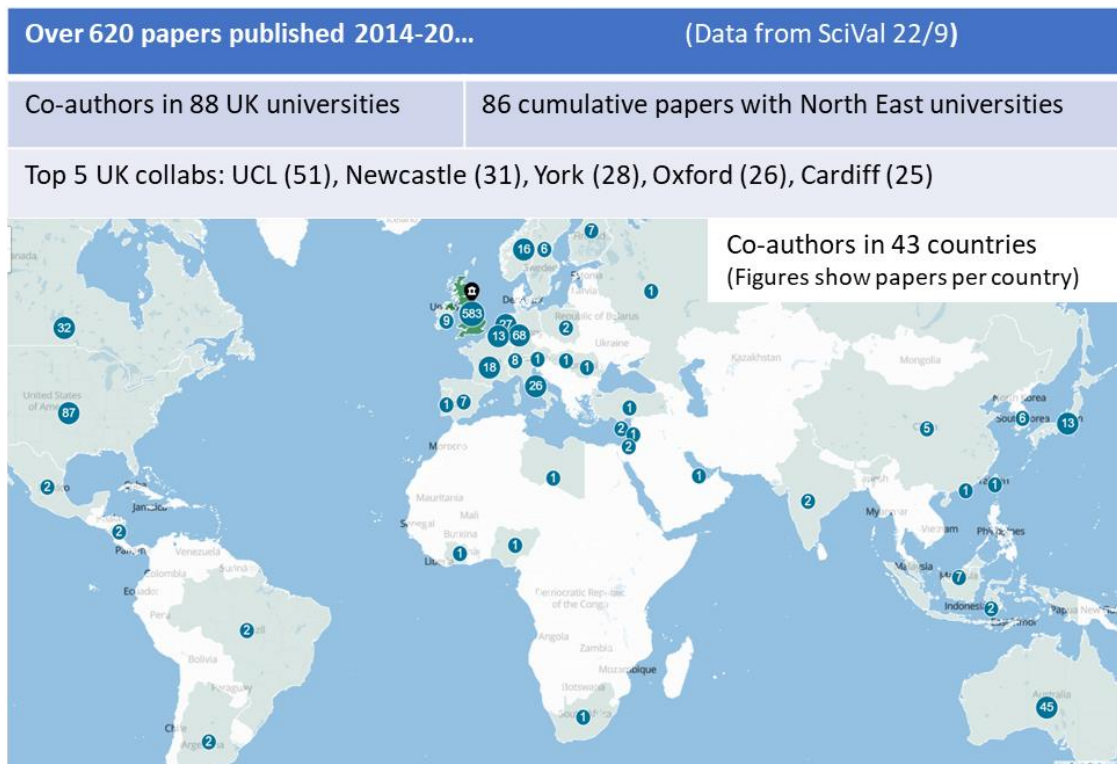
4.1.2 External networks and meetings

Our centres also facilitate external networks. DevDis and LAMP in particular include colleagues from Newcastle (with a number of jointly-supervised doctoral students supported by ESRC and BBSRC), Sunderland and York regionally, as well as departments throughout the UK such as St Andrews, Bristol, Edinburgh, Manchester, and Nottingham. Both Centres run regional events and draw in distinguished speakers (e.g. 2 Fellows of the Royal Society) with high rates of ECR attendance. Other **regional academic networks** led and/or developed by Durham staff include NEURACLIN, North East Autism Research, and the North East Face and Person Perception meetings. Finally, staff are able to use Research Committee funds to bring potential collaborators to Durham on short-term visits as well as using the IAS and COFUND schemes to host longer term **visiting fellowships** (Table 2/5B.2.1).

In total, during the assessment period, the department has hosted **8 regional meetings** as well as **17 national or international meetings** including the Experimental Psychology Society, UK Williams Syndrome meeting and International Consortium on Hallucination Research. Staff have also co-/organised four international conferences and three symposia held overseas.

Evidence that these networks and meetings support strong collaborations can be seen in the **high rates of joint publications** in this period both within the region and with leading universities across the UK (see Figure 6). Indeed, roughly 88% of all papers published this REF period have at least one external co-author. Similarly, staff have past and ongoing **international collaborations** with universities across four continents. These collaborations have also attracted high profile funding such as from the Templeton Foundation, Leverhulme, and UKRI joint funds with the Dutch, German and Japanese research agencies, and have yielded outputs with co-authors spread over 43 countries (Figure 6).

Figure 6. Collaborations as indexed by outputs published in the department.

Over 620 papers published 2014-20…	(Data from SciVal 22/9)
Co-authors in 88 UK universities	86 cumulative papers with North East universities
Top 5 UK collabs: UCL (51), Newcastle (31), York (28), Oxford (26), Cardiff (25)	

Co-authors in 43 countries
(Figures show papers per country)

4.2 Academic Citizenship and Esteem

The department supports staff taking on major leadership roles (such as editorships) with **credit in our workload model** and these roles are recognised in our promotions and progression system. Our strong contributions in these domains are summarised in Figure 7.

At the national and international level, Durham staff **lead Learned Societies and networks** such as the European Human Behaviour and Evolution Association (Boothroyd: Vice President), the European Brain and Behaviour Society (Easton: council member), the British Psychological Society (Crisp: Research Board Deputy Chair; Riby: Developmental Section President Elect), the Experimental Psychology Society (McGregor: committee member 2015-18), the North Sea Meeting on Brain Asymmetries (Hausmann), the International Consortium on Hallucination Research (Fernyhough: steering committee) and are contributing to the development of larger scale, more generalisable and reproducible work through the **Psychological Science Accelerator** (Nguyen and former PGR Dutra). Our doctoral students have also led on involvement with the **UK Reproducibility Network** (Reardon).

Staff likewise hold positions on **national panels** such as the REF (Crisp; interdisciplinary advisor); ESRC (Riby, Crisp), BBSRC and NC3Rs (Easton), and Wellcome (Fernyhough: co-opted member) provide extensive **grant reviewing** services within the UK and abroad (see Figure 7).

J Theoretical Social Psychology was founded by Head of Department Crisp and over half our staff (vs 1/3 in 2013) have held **editor and editorial board roles on 26 journals** (see Figure 7), including flagship specialist outlets such as *Animal Behaviour*, *J Experimental Psychology* and *J Social & Personality Psychology* and guest editing issues/topics in leading journals such as *PNAS.*

Figure 7. Academic esteem and citizenship

6 BPS prize winners	Society leadership: BPS, BPS Developmental Section, European Brain and Behaviour Society, European Human Behaviour and Evolution Association, Experimental Psychology Society, SPPSI
Funding panel membership: Arts Council, BBSRC, ESRC, NC3Rs, Wellcome	

	Prop. of staff	
External examining	78%	43 PhDs examined (9 international)
Invited talks	68%	>80 invited keynotes, panels and symposia contributions.
International invitations	59%	84 invited seminars in 23 countries
Grant reviewing	91%	For **British government funders** including ESRC, BBSRC, MRC, NIHR, Arts Council England, Health and Care Research Wales; **Leverhulme**; the **ERC** and Open Research Area networks; plus **21 international science councils and funders across 19 countries**
Editorial roles	56%	Editors and action editors of 22 journals Editorial board/consulting editors for 9 journals Guest editors on 4 special topics.

The contribution of our scholars to broader academic research has been recognised through **prestigious prizes and fellowships** such as

- the *Canadian Institute for Advanced Research Senior Fellow* award (Kentridge);
- the German *Hector Fellow Academy speakers award* (Olkkonen);
- *Early Career Award by the International Society for Behavioural Medicine* (Vasiljevic);
- *BPS William Inman Prize* (Lane & Smith);
- the BPS Developmental Section *Margaret Donaldson Award* (Riby);
- the BPS Forensic Division *Award for Distinguished Contributions to Academic Knowledge in Forensic Psychology* (Towl);
- the BPS Social Division *Early Career Researcher* award (Van de Vyver);
- the *BPS Book prize* (Towl);
- the *BPS President's Awards for Distinguished Contributions to Psychological Knowledge* (Crisp) and *Psychology in Practice* (Towl).

4.3 Stakeholders and the wider society

4.3.1 Stakeholder involvement

As summarised in Figure 8, we have strong links to stakeholders both within the UK and internationally which result in real-world impacts of our research. These include:

- **patient and public involvement** (PPI), with particular strength in this respect on stroke (Ellison, Lane), blindness through Thaler's work on echolocation, voice hearing (Alderson-Day, Fernyhough, ICS2-Voices), and Autism and Williams Syndrome (Hanley, Riby);

- **clinical partners**, with particular representation on: dementia through networks led by Datchler & Lever; stroke and voice hearing (Alderson-Day, Ellison, Fernyhough, Lane; see ICSs); prenatal medicine (Reissland), and developmental disorders (Hanley, Riby);

- **policy makers** (Boothroyd: evidence to select committees on body image, Crisp, Easton, Leite and Van de Vyver: reports and consultation on social integration and diversity for

regional, UK and UN audiences including Arts Council England; Leite: consultation on international development funding; Towl: Office for Students, Harris Report on Prison Suicide, member of the Health and Care Professions Council; Vasiljevic: evidence for government and UN on food/alcohol labelling and sustainability.)

- and **industrial, commercial or service partners** both in terms of consultancy (see Figure 5) and ongoing collaborations (e.g. Cowie: *VICON*; Ellison: *Channel 4*; Fernyhough: *Ninja Theory*; Kentridge: *P&G*; Lever: European Space Agency; Towl: HM Prison Service).

Collaboration

Stakeholder networks
- Dementia: NEURACLIN network, Durham Against Dementia
- Developmental disorders: DevDis, William Syndrome Foundation, NE Autism Society
- Health: Academic Health Science Network, ARC, Northern Health Sciences Alliance, Northern Pain Consortium
- Hearing Voices Network
- N8

Public Sector partners
- Edinburgh Int. Book Festival
- HM Prison Service

3rd Sector
- Animal welfare: NC3Rs, Animal Free Research UK, Lola y Bonobo sanctuary
- Colour Collective UK
- People United
- Bare-toed Dance Company
- Reach UK

Commercial
- Channel 4
- Proctor & Gamble
- Software collaboration: VICON, Ubisoft, NinjaTheory*
- Internal communications training: RAF, Virgin Trains

Policy and technical reports
- *Durham Commission on Creativity and Education*
- *Arts and community engagement*
- *Story-telling and prejudice*
- *The Harris Report* *
- *Addressing Student Sexual Violence in HE: A Good Practice Guide*

Policy consultation for:
- GCRF, Newton Fund
- Evidence submitted to govt. (Body image, Food/alcohol labelling)
- UN Commission on Diversity

Translational products
- Understandingvoices.com*
- Hellblade*
- MUSE CBT package*
- Continuous trials equipment
- Dementia: early onset testing
- Stroke: **DREX rehabilitation training***
- Echolocation training paradigm
- TPH Surveys Ltd.

Media: 6 PopSci books, BBC/PBS documentaries, The Conversation

Translation

Figure 8. Summary of stakeholder collaborations/networks and resulting translational outcomes. Starred items feature in an ICS.

As discussed (5B.1.4.3), **these relationships have been strategically supported and developed** through: our Research Centres and Institutes; our regional networks above; by direct introductions made by the University's dedicated Impact development team (including expertise on policy and commercial relationships); and through institutional networks such as N8 and the Northern Health Sciences Alliance where department staff have leadership roles. We recently

appointed Nicola Wilson, deputy CEO of NHSA as a Professor in Practice, bringing her experience as a multiplier in research networks including HEIs, NHS trusts and business.

The department has hosted a number of **events for public and professional stakeholders**; for instance, 30 Educational Psychologists and 150 families of children with Williams Syndrome have attended workshops led by Riby, while DevDis public lectures with distinguished speakers on developmental disorders attract up to 180 delegates at a time. Similarly, NEURACLIN and DurhamAgainstDementia meetings typically host 5-10 clinicians from the region, and 30 industry and government representatives attended a 2019 Behavioural Science Showcase event. Over 70 practitioners have attended training at Durham on voice hearing led by Alderson-Day, and a mixed audience of 200 attended a public launch event for online materials on voice hearing (see ICS2-Voices).

As discussed in Section 1 and below, these relationships facilitate the development of meaningful impacts based on well-targeted empirical evidence. **Stakeholders also enhance the research base in the department** through both direct provision of resource (e.g. Channel 4, VICON and P&G have funded researchers and/or facilities; see Section 2) and by being critical contributors to collaborative funding applications and research-led practical outputs. For instance, the ICS2-Voices team and funding was built with stakeholders, as was: Boothroyd's Wellcome Seed award on eating disorder prevention in rapidly developing countries; and Lever's work on cognitive function tests for both early Alzheimer's detection (sponsored by the Australian Alzheimer's Research Foundation), and in long-term astronauts (funded by ESA).

4.3.2 Impacts

These relationships have resulted in standout impacts discussed in our Case Studies, which have changed, and indeed saved, the lives of highly vulnerable populations (prisoners, stroke survivors, voice hearers and those with psychosis). However, **our strategic approach to seeding impact across all research groups and interdisciplinary research centres** (5B.1.3.3) **has increased staff participation** in these activities; 18 members of staff reported impact related activity in the assessment period. This has resulted in a number of policy reports and translational outputs (see Figure 8) and impacts across a wide range of domains. For instance:

- We have **created multiple successful interventions and treatments** in clinical practice and beyond. The MUSE CBT package developed in **ICS2-Voices** has helped over 300 patients with psychosis in just the two years since launch and was awarded second place in the Digital Innovation in Health and Social Care category of the NHS's Bright Ideas in Health Awards 2019. Over 2250 stroke patients are using our DREX app to regain function through visual attention training (ICS1-DREX), while 104 visual impairment professionals across the UK are now supporting blind clients to increase their mobility through echolocation training (Thaler). We are also **shaping clinical decisions**, through early detection of dementia (Lever: 200 patients in clinical trials) and reduction in unnecessary pain medications (Ellison: Gabapentin and Opioid Tapering Tool).

- We have **informed institutional practices** with regard to, for example, sexual violence prevention (Towl: universities), dissemination of new practices within organisations (Ellison: the RAF, *Channel 4* and *Virgin Trains*), advertising (*Channel 4*), improved implicit bias training (Crisp/Marcinko) and underwriting of catastrophe risk (Weick: *MSAmlin*). Towl's work with HM Prison Service has led to policy and training changes and a sustained reduction in lost lives (ICS3-PrisonSuicide). We have **also influenced policy** on: the use of cultural products/production in **improving social integration** at Arts Council England (10 Year Strategy), the Equality and Human Rights Commission, the AHRC, OFSTED, and the Department for Digital, Culture, Media, and Sport (Van de Vyver, Easton, Crisp); and **international aid** through the Independent Commission for Aid Impact (Leite).

- We are **supporting animal welfare** in research by advising advocacy groups (Ellison) and developing and commercialising products to reduce animal numbers and improve reliability and reproducibility in behavioural neuroscience laboratories (Easton); to date this new equipment is being used in laboratories across 10 UK universities. Clay's role as scientific

consultant at *Lola y Bonobo* has led to improvements in surrogacy care for orphan primates and re-introduction programmes.

- We are helping parents of, and individuals with, **developmental disorders** such as Williams Syndrome to live more safely and deal with anxiety, with internationally distributed parent and carers guides (Hanley/Riby).

4.3.3 Public dissemination

All of our work serves to deepen public understanding of human behaviour, increasing acceptance of psychological conditions and those who bear them. We use a variety of outlets to help this process including:

- **Creation of cultural products**: staff have written six popular psychology books (e.g. on pain, diversity, suicide, headaches, and voice hearing), contributed to PBS and BBC documentaries (consulting or featured scientists: Boothroyd, Clay, Ihssen, Van de Vyver), and in the case of ICS2-Voices, over a million people purchasing and playing the BAFTA-winning game *Hellblade: Senua's Sacrifice* have been educated about the experiences of voice hearers.

- **Working with dissemination and creative bodies** such as Colour Collective (Olkkonen), and widespread involvement with 'Pint of Science', The Conversation, and Café Scientifique.

- Interviews with a wide range of national and international print, radio and tv **media**.

- **Public lectures**, seminars, talks and stand-up routines to a variety of audiences (school children, teenagers, expectant parents, Synod of Bishops) including high profile events such as the Cheltenham Science Festival, Hay Festival (Clay) and at major venues such as the Natural History Museum.

- We have particular success in **large-scale public events**. Through our involvement in Celebrate Science in school holidays, we have reached over 6000 visitors a year, while the ICS2-Voices team brought a further 6000 visitors to the Hearing Voices exhibition, and 730 to associated events, with over 7000 visitors to online material on understanding voices.

Collectively, these efforts have helped inform lay audiences of important perspectives across the full range of our expertise including animal welfare, dementia, developmental disorders, eating disorders, social integration, stroke, visual perception, voice hearing and psychosis and sexual violence and suicide.